ABSTRACT

An electrode with three-dimensional capabilities for detection and control of brain state changes of a subject. The electrode includes a disk portion having an upper surface and a lower surface, and a shaft portion secured to and extending perpendicularly outwardly from the lower surface of the disk portion; the shaft portion having an outer surface. The disk portion and shaft portion may include one or more recording or stimulating contact surfaces structured to operatively interact with the brain of a subject. Insulating material isolates each of the recording or stimulating contact surfaces from each other. At least one conductor operatively and separately connect each of the recording or stimulating contact surfaces in communication with external apparatus. The disk portion and shaft portion are structured relative to each other to operatively provide support and anchoring for each other while providing three-dimensional capabilities for detection and control of brain state changes of a subject. Modified embodiments include insertible/retractable electrode wires, both contained in channels and sheathed in axially displaceable cannulae; activating mechanisms for inserting/retracting the electrode wires and/or cannulae; and multiple shaft portions.